REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: ATLANTIC AND GULF COASTAL PLAIN REGION

INTRODUCTION

- PURPOSE AND USE OF THIS REGIONAL SUPPLEMENT:

- NATIONWIDE EFFORT TO ADDRESS REGIONAL WETLAND CHARACTERISTICS AND IMPROVE THE ACCURACY AND EFFICIENCY OF WETLAND-DELINEATION PROCEDURES.

- DESIGNED FOR USE WITH THE CURRENT VERSION OF THE 1987 MANUAL.

- REPLACES THE VEGETATION INDICATORS, THE HYDRIC SOILS INDICATORS AND HYDROLOGY INDICATORS IN THE 1987 MANUAL.

- ESTABLISHES A HYDROLOGY STANDARD FOR WETLANDS THAT PERIODICALLY LACK INDICATORS OF WETLAND HYDROLOGY.

INTRODUCTION

- APPLICABLE REGION
- ATLANTIC AND GULF COASTAL PLAIN REGION.
- CONSISTS OF ALL OR SIGNIFICANT PORTIONS OF 17 STATES:
- AL, ARK, DE, FL, GA, KY, LA, MD, MS, M , NJ, NC, OK, SC, TN, AND VA.
- ALL OF LRR O
- ALL OF LRR T
- All OF LRR U
- MLRA 149A OF LRR S (NORTHERN COASTAL PLAIN)
- MLRAs 133A, 133B, 134, 135A, 135B, 137 AND 138 OF LRR P

INTRODUCTION

- MOST OF THE WETLAND INDICATORS PRESENTED IN THIS SUPPLEMENT ARE APPLICABLE THROUGHOUT THE ATLANTIC AND GULF COASTAL REGION. HOWEVER, SOME ARE ONLY APPLICABLE TO PARTICULAR SUBREGIONS (LRR) OR SMALLER AREAS (MLRA).

Hydrophytic Vegetation Indicators

Hydrophytic Vegetation Indicators

Regional Supplements:

- Dominance Test (50/20 rule) (all regions)
- Prevalence Index (all regions)
- Morphological Adaptations (all regions except the Atlantic & Gulf Coastal Plain)
- Wetland Cryptogams (Alaska and Western Mountains, Valleys & Coast regions only)

Hydrophytic Vegetation Indicators

Dominance Test:

- Same as in the 1987 Manual, except in the Atlantic Gulf Coast Region the ‘+’ and ‘-’ modifiers are not used

Hydrophytic Vegetation Indicators

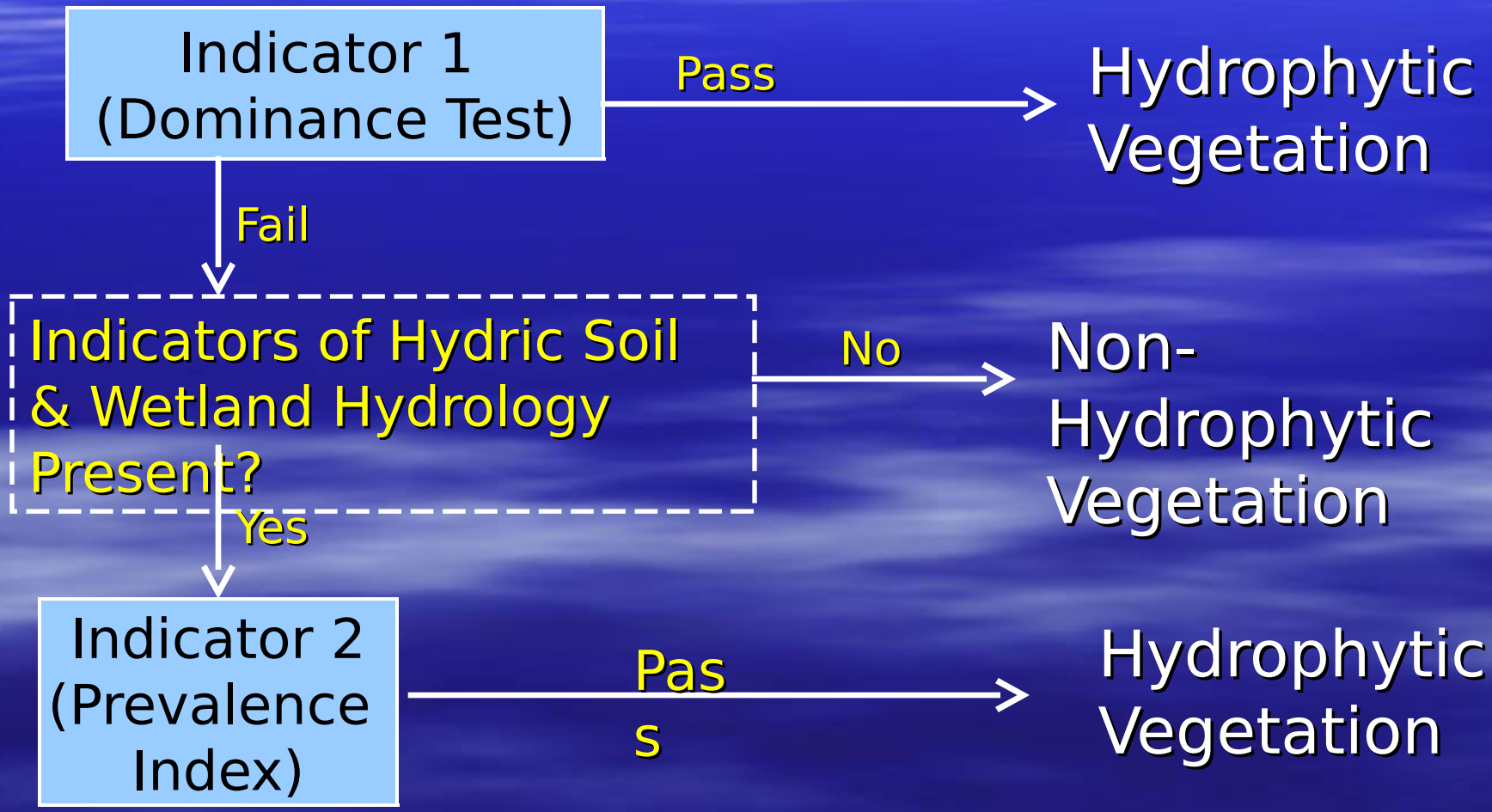
Prevalence Index:

- The prevalence index (PI) is 3.0 or less
- PI is a weighted-average wetland indicator status of all (or nearly all) species in the sample
  - OBL=1, FACW=2, FAC=3, FACU=4, UPL=5
  - Weighted by percent cover
  - At least 80% of the total plant cover must be correctly identified and have an assigned indicator status (including UPL)
  - ‘+’ and ‘-’ modifiers are not considered

Prevalence Index Calculation

Total % cover of:		Multiply by:	
OBL species	**0**	× 1 =	**0**
FACW species	**90**	× 2 =	**180**
FAC species	**45**	× 3 =	**135**
FACU species	**15**	× 4 =	**60**
UPL species	**12**	× 5 =	**60**
Column totals:	**162** (A)		**435** (B)

Typical Procedure



Data Sources on the Web

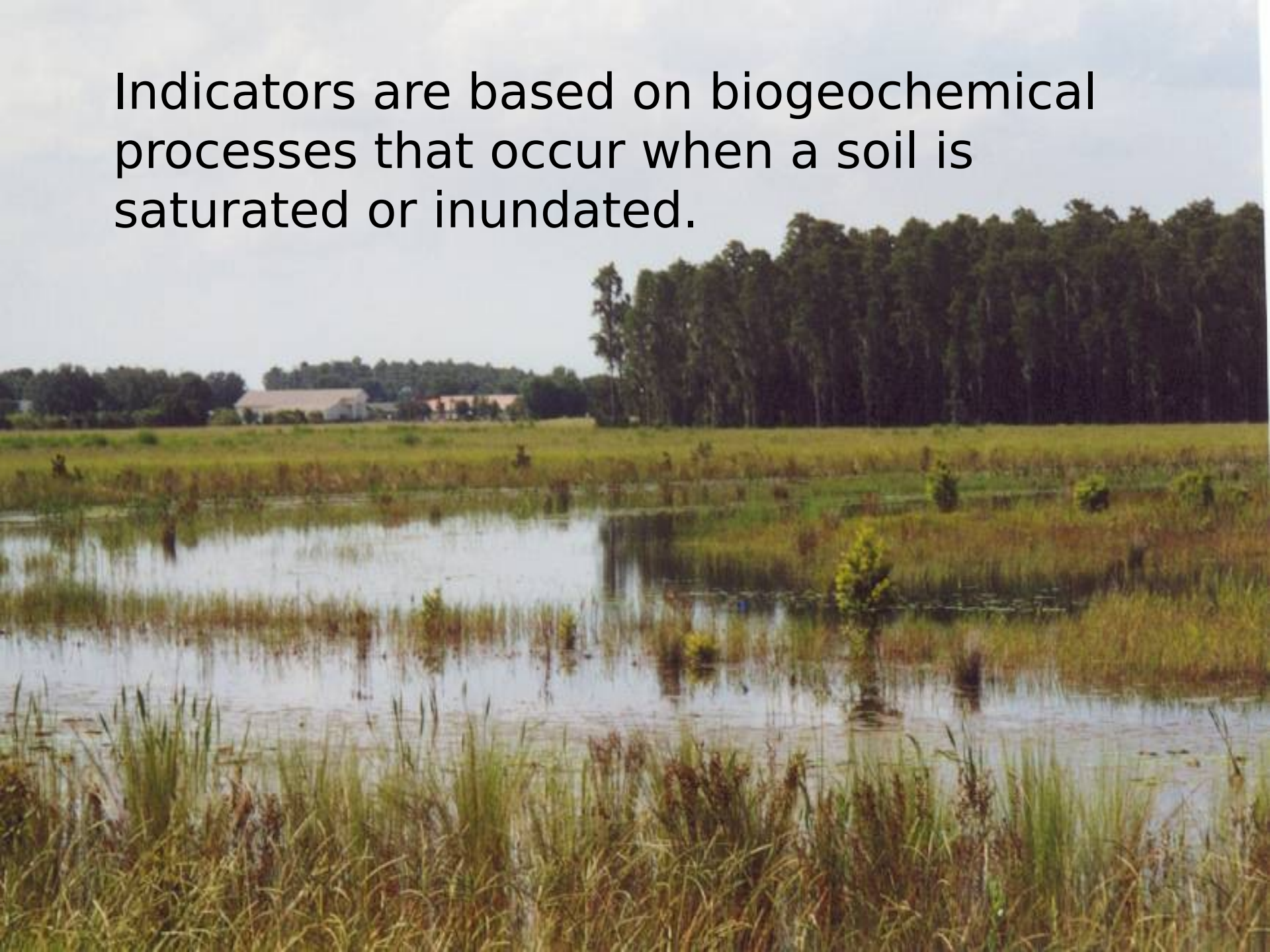
- FWS Lists of Plant Species that Occur in Wetlands
  - http://www.fws.gov/nwi/plants.htm
- USDA Plants Database
  - http://plants.usda.gov/

NTCHS Field Indicators of Hydric Soils

NTCHS hydric soil indicators are based on properties you can

- Feel
- See
- Smell

Indicators are based on biogeochemical processes that occur when a soil is saturated or inundated.



Where Do We Begin Our Observations?

Start below any fibric and hemic material (beneath the knife blade)

- Unless saturated organic material is >8 inches thick

Field Indicators of Hydric Soils in t

http://soils.usda.gov/use

United States Department of Agriculture

NRCS Natural Resources Conservation Service

In cooperation with the National Technical Committee for Hydric Soils

US Army Corps of Engineers Engineer Research and Development Center

Field Indicators of Hydric Soils in the United States

A Guide for Identifying and Delineating Hydric Soils, Version 6.0 (2006)

Hydric Soil Indicators Schema
Five Part Structure

1. **Alpha-numeric listing**

2. Short name

3. Application to LRRs

S4. Sandy Gleyed Matrix. *For use in all LRRs except W, X, and Y*. A gleyed matrix that occupies 60 percent or more of a layer starting within 6 in. (15 cm) of the soil surface.

4. Description of Field Indicator

5. User notes

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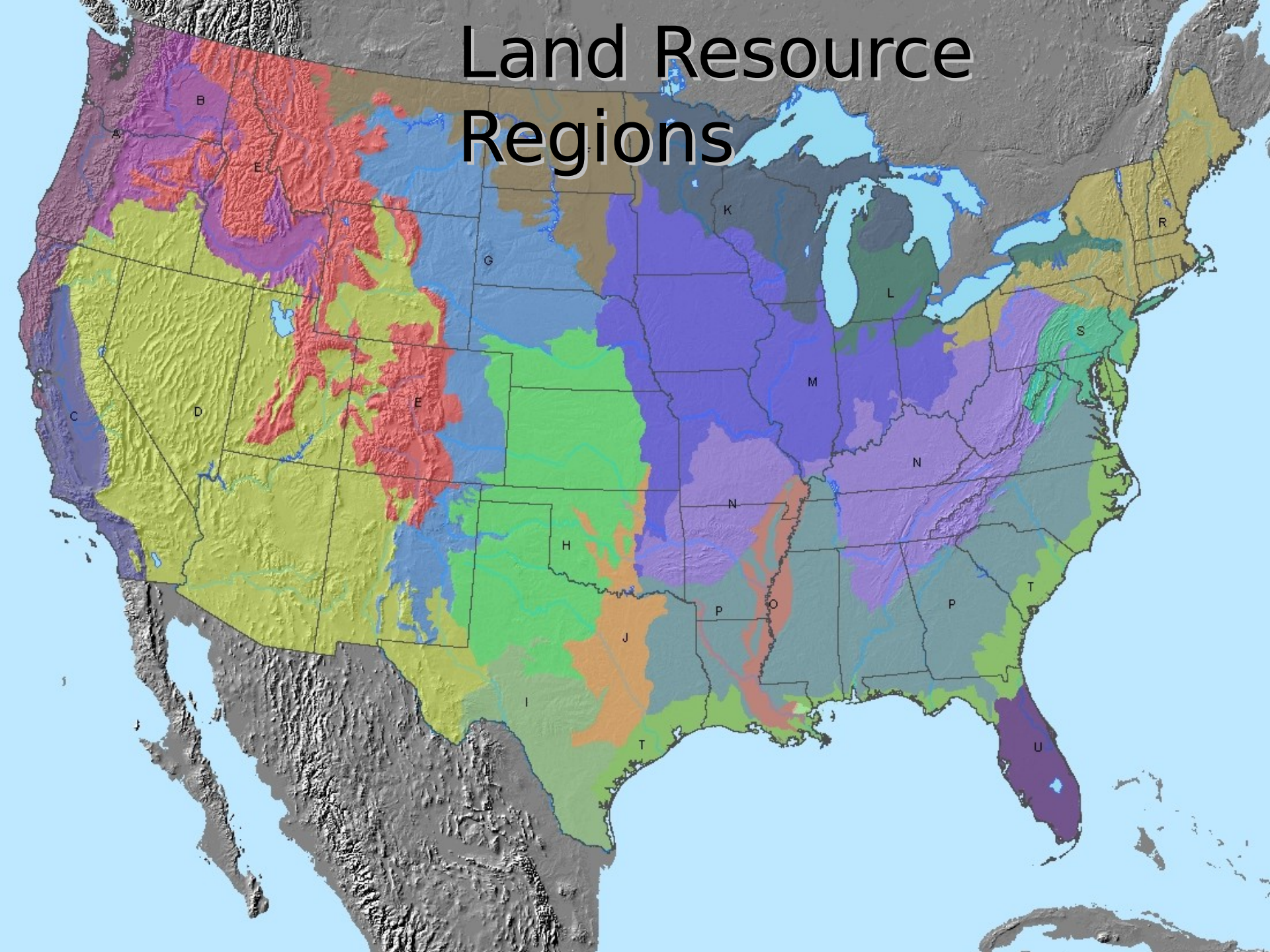
Sandy Gleyed Matrix User Notes: Gleyed colors are not synonymous with gray colors. Gley colors are those colors…

Regionalization of Hydric Soil Indicators

- NTCHS approved each indicator for use in specific regions of US
  - Most are based on LRRs
  - Some are based on the smaller MLRAs

Land Resource Regions



Regionalization of Hydric Soil Indicators

An example of regionalization:

- Only presence of muck is required in south Florida
- Thicker layers are required farther north

Basic Terms

Basic terms used throughout the indicators:

- Depleted Matrix
- Gleyed Matrix
- Reduced Matrix

Depleted Matrix

- Refers to the volume of a soil horizon or subhorizon from which iron has been removed or transformed by processes of reduction and translocation to create colors of low chroma and high value

Depleted Matrix

The following combinations of value and chroma identify a depleted matrix:

1. Matrix value 5 or more and chroma 1 with or without redox concentrations as soft masses and/or pore linings; or
2. Matrix value 6 or more and chroma 1 or 2 with or without redox concentrations as soft masses and/or pore linings; or

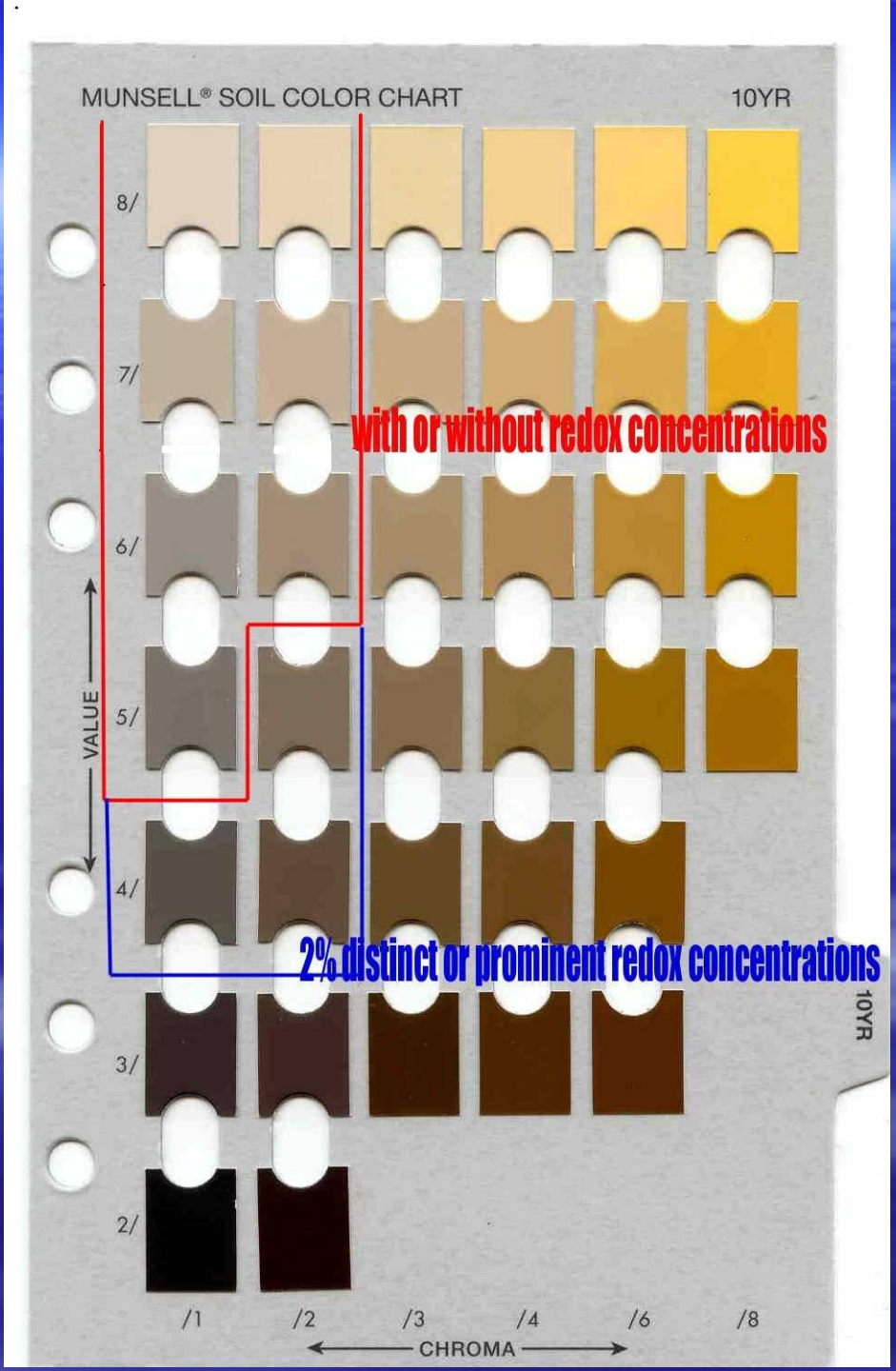
Depleted Matrix (cont.)

The following combinations of value and chroma identify a depleted matrix:

3. Matrix value 4 or 5 and chroma 2 and has 2 percent or more distinct or prominent redox concentrations as soft masses and/or pore linings; or
4. Matrix value 4 and chroma 1 and has 2 percent or more distinct or prominent redox concentrations as soft masses and/or pore linings.

Depleted Matrix

Matrix colors that require, and do not require, 2% or more distinct or prominent redox concentrations



Gleyed Matrix

A gleyed matrix has the following combinations of hue, value, and chroma and the soils are not glauconitic:

1. 5G with value 4 or more and chroma is 1 or 2; or
2. N with value 4 or more; or
3. 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value 4 or more and chroma is 1

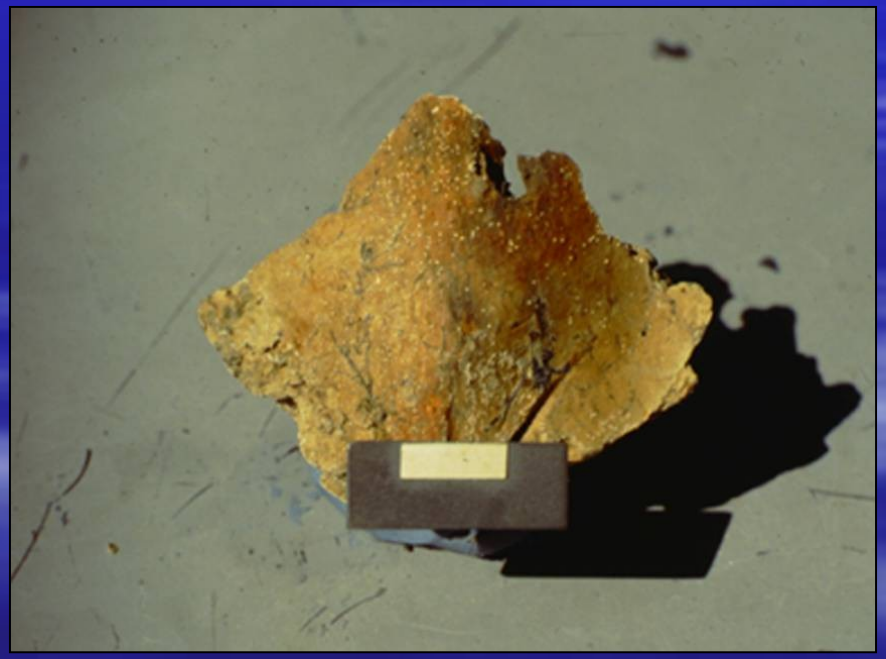
MUNSELL® COLOR CHART 1 FOR GLEY
GLEY 1
8/
7/
6/
5/
4/
3/
2.5/
VALUE
N
10Y
5GY
10GY
5G
5G
MUNSELL® COLOR CHART 2 FOR GLEY
GLEY 2
8/
7/
6/
5/
4/
3/
2.5/
VALUE
10G
5BG
10BG
5B
10B
5PB
GLEY
NOT GLEY

Reduced Matrix

- Matrix that upon initial exposure fits the color requirements of
  - depleted matrix
  - gleyed matrix
- but changes color (redder hue) when exposed to air for about 30 minutes.

Reduced Matrix

Before and after exposure to air



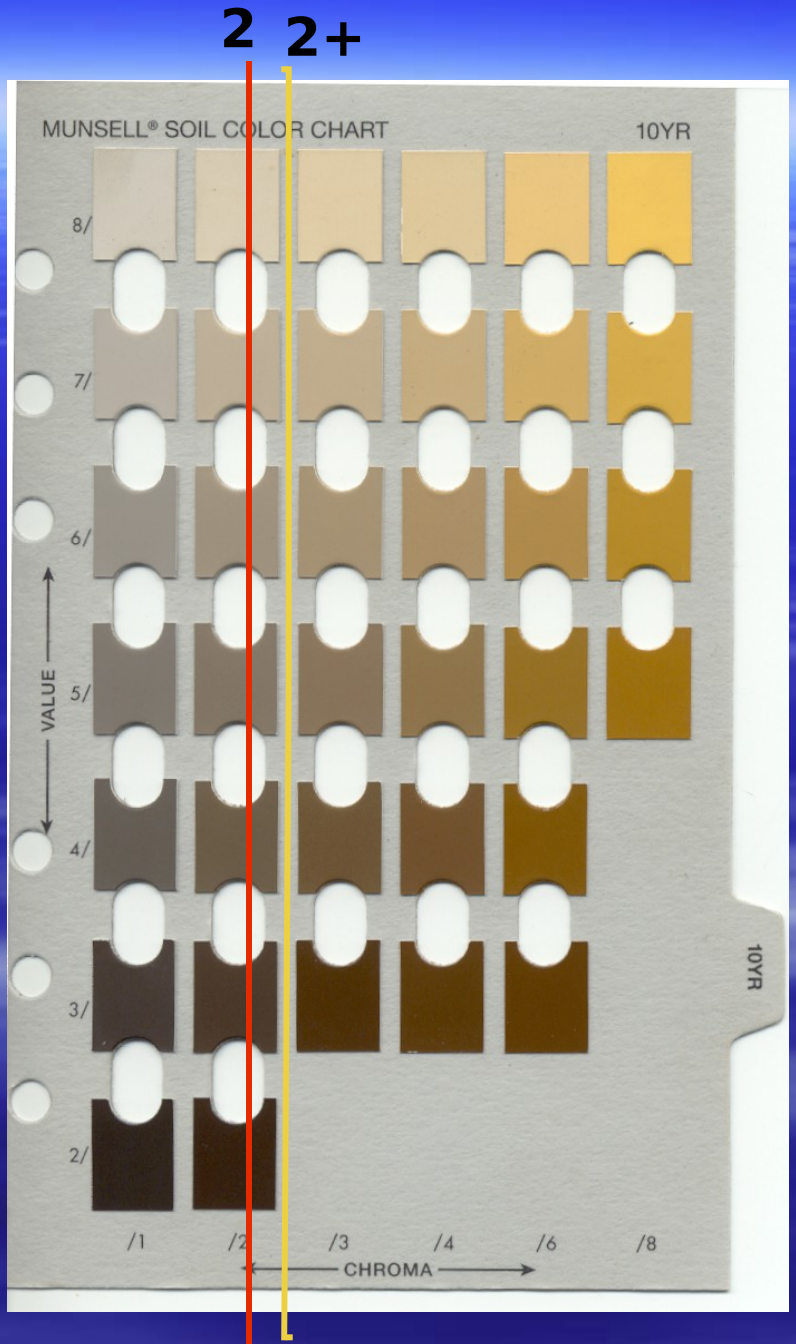
Moist Colors

All color requirements (hue, value, and chroma) are for moist soil colors

- If dry, moisten to record color
- If wet, allow to dry to moist state

Chroma

- Colors specified in the indicators do not list decimal points
- Colors do occur between Munsell chips
- Do not round color to qualify as meeting an indicator



Common Indicators

Caveat

- Unless otherwise indicated, all mineral layers above any of the indicators have
  - Dominant chroma 2 or less, or
  - Layer(s) with dominant chroma >2 is less than 6 in. (15 cm) thick

F3 – Depleted Matrix

Layer with a depleted matrix that has

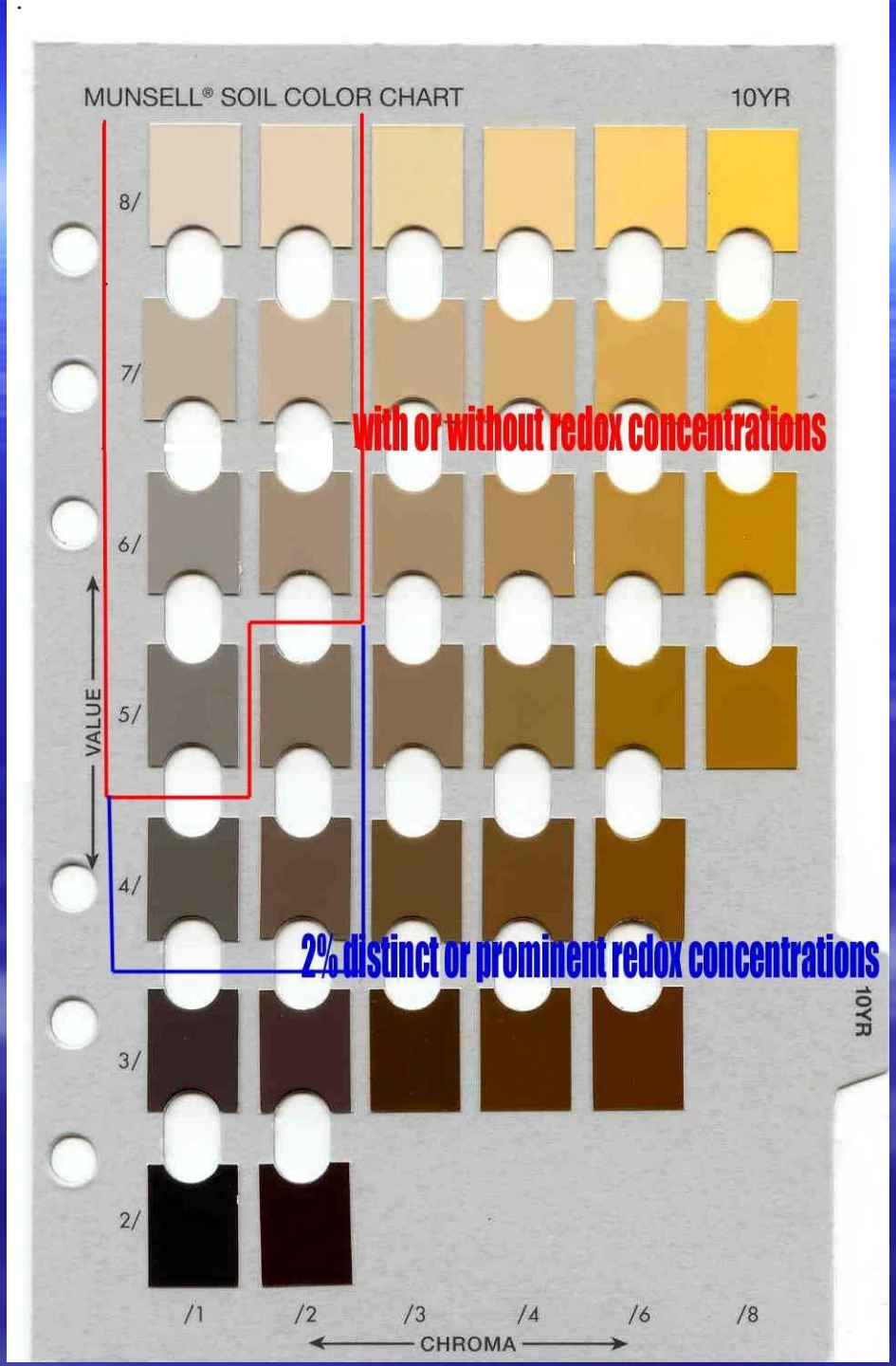
- 60% or more chroma ≤2
- minimum thickness of either:

a. 2 in. (5 cm) if 2 in. is entirely within the upper 6 in. (15 cm) of the soil, or

b. 6 in. (15 cm) and starts within 10 in. (25 cm) of the soil surface

Depleted Matrix

Matrix colors that require, and do not require, 2% or more distinct or prominent redox concentration s



Chroma is 1 within a depth of about 4 to 6 in. Redox concentrations are absent.

Chroma is 2 below a depth of about 6 in. Redox concentrations are present as required.

F6 – Redox Dark Surface

Layer at least 4 in. (10 cm) thick entirely within the upper 12 in. (30 cm) of the mineral soil that has:

a. matrix value ≤3

chroma ≤1 with

≥2% distinct or prominent redox concentrations as soft masses or pore linings, or

(see next slide)

F6 – Redox Dark Surface

b. matrix value ≤3

chroma ≤2 with

≥5% distinct or prominent redox concentrations as soft masses or pore linings

Prominent redox concentrations as soft masses and pore linings are present.

Often, as in this soil, the redox concentrations are small (fine).

F8 – Redox Depressions

In closed depressions subject to ponding, ≥5% distinct or prominent redox concentrations as soft masses or pore linings in a layer

- ≥2 in. (5 cm) thick
- entirely within the upper 6 in. (15 cm) of the soil

A11 – Depleted Below Dark Surface

Layer with a depleted matrix that has 60% or more chroma ≤2 starting within 12 in. (30 cm) of the surface that has a minimum thickness of either:

a. 6 in. (15 cm), or

b. 2 in. (5 cm) if the 2 in. consists of fragmental soil material

(see next slide)

A11 – Depleted Below Dark Surface

- Loamy or clayey layer(s) above the depleted matrix have
  - value 3 or less
  - chroma 2 or less
- Sandy layer(s) above the depleted matrix are 70% or more covered/coated with organic matter and have
  - value 3 or less
  - chroma 1 or less

- A11 is similar to F3 (Depleted Matrix)
- Darker colored surface horizons imply more wetness
- Indicates hydric conditions if the depleted matrix occurs within 12 in

A12 – Thick Dark Surface

Layer at least 6 in. (15 cm) thick with a depleted matrix that has

- 60% or more chroma 2 or less (or a gleyed matrix)
- starting below 12 in. (30 cm) of the surface

(see next slide)

A12 – Thick Dark Surface

Layer(s) above the depleted or gleyed matrix have

- value 2.5 or less
- chroma 1 or less to a depth of 12 in. (30 cm),
- and value 3 or less
- chroma 1 or less in the remainder of the epipedon (surface layer).

Sandy layer(s) above the depleted matrix are 70% or more covered/coated with organic matter

Depleted matrix is below a mollic epipedon

Deep observation is often necessary

Cautions with the “A” indicators

- Many of the “A” indicators require exacting amounts of organic carbon
  - Obtain samples of soils with known amounts of organic carbon for calibration
  - Work with a local wetland scientist familiar with your region
- Over-estimating the amount of organic carbon in a soil is the norm

S5 – Sandy Redox

Layer starting within 6 in. (15 cm) of the surface

- at least 4 in. (10 cm) thick
- matrix 60% or more chroma 2 or less
- 2% or more distinct or prominent redox concentrations as soft masses

Indicator S5-Sandy Redox

S6 – Stripped Matrix

- Layer starting within 6 in. (15 cm) of surface in which
  - Fe/Mn oxides and/or
  - organic matter

(see next slide)

S6 – Stripped Matrix

- have been stripped from the matrix . . . forming a faint, diffuse splotchy pattern of two or more colors
  - The stripped zones are 10% or more of the volume
  - rounded and approximately 0.5 to 1 in. (1 to 3 cm) in diameter

S6 – Stripped Matrix

Indicator S6- Stripped Matrix

Summary

Hydric soil indicators are based on biogeochemical processes that occur when soils are saturated or inundated

- Iron
- Carbon
- Carbon and Iron
- Carbon and/or Iron
- Carbon and Iron/Manganese
- Iron/Manganese
- Sulfur
- Algae

Summary

- Field Indicators of Hydric Soils provide structure for the regionalization of hydric soil indicators
- Defines
  - Depleted matrix
  - Gleyed matrix
  - Reduced matrix

Summary

- Moist colors should be recorded
- Colors do occur between Munsell chips
  - soil colors should not be rounded to qualify as meeting an indicator

Wetland Hydrology Indicators

What is Wetland Hydrology?

Wetland hydrology is present if the area is flooded regularly by tides or is inundated or saturated during the growing season at a frequency and duration sufficient to maintain vegetation and soil conditions characteristic of wetlands.

- The hydrologic regime required to create and maintain a wetland is not well understood and probably varies locally and regionally due to climate, landforms, geology, soils, and plant and animal adaptations

Evaluating Wetland Hydrology

- Vegetation and soils
  - Reflect a site's medium- to long-term wetness history
  - Hydrophytic vegetation and hydric soils are evidence of wetland hydrology if hydrology has not been altered
- Wetland hydrology indicators
  - Provide evidence of recent inundation or soil saturation
  - Help ensure that soil and vegetation indicators are not relicts of a past hydrologic regime
- Direct hydrologic monitoring
  - When wetland indicators are absent due to disturbance or other problems

Wetland Hydrology Indicators

Regional Supplements

- Presented in four groups
  - Observation of surface water or saturated soil (Group A)
  - Evidence of recent inundation (Group B)
  - Evidence of recent soil saturation (Group C)
  - Evidence from other site conditions or data (Group D)
- Categorized as “primary” or “secondary”
  - Primary – any one indicator is sufficient
  - Secondary – two or more indicators are required
  - May vary by region

Wetland Hydrology Indicators

Regional Supplements

- Group A (examples may vary by region)
  - A1 (Surface water)
  - A2 (High water table)
  - A3 (Saturation)

Wetland Hydrology Indicators

A1 – Surface water

Wetland Hydrology Indicators

A2 – High water table

- Water table is 12 inches or less from the surface

Wetland Hydrology Indicators

A3 – Saturation

- Indicated by water glistening on ped faces and interiors within 12 inches of the surface
- Requires a water table below the saturated zone

Wetland Hydrology Indicators

Regional Supplements

- Group B (examples may vary by region)
  - B1 (Water marks)
  - B2 (Sediment deposits)
  - B3 (Drift deposits)
  - B4 (Algal mat or crust)
  - B5 (Iron deposits)
  - B6 (Surface soil cracks)
  - B7 (Inundation visible on aerial imagery)
  - B8 (Sparsely vegetated concave surface)
  - B9 (Water-stained leaves)
  - B10 (Drainage patterns)
  - B13 (Aquatic invertebrates)

Wetland Hydrology Indicators

B1 – Water marks

Wetland Hydrology Indicators

B2 – Sediment deposits

- Thin coatings of silt or organic material

Wetland Hydrology Indicators

B3 – Drift deposits

- Rafted debris or litter

Wetland Hydrology Indicators

B4 – Algal mat or crust

Wetland Hydrology Indicators

B5 – Iron deposits

- Reduced iron emerges with groundwater and oxidizes on the surface

Wetland Hydrology Indicators

B6 – Surface soil cracks

- Does not include deep cracks in clay soils (e.g., Vertisols)

Secondary indicator

Wetland Hydrology Indicators

- B7 inundation visible on aerial imagery

Wetland Hydrology Indicators

B8 – Sparsely vegetated concave surface

- <5% ground cover
- A woody overstory may or may not be present

Secondary indicator

Wetland Hydrology Indicators

B9 – Water-stained leaves

Wetland Hydrology Indicators

B10 – Drainage patterns

Secondary indicator

Wetland Hydrology Indicators

B13 – Aquatic invertebrates

Wetland Hydrology Indicators

- B15 Marl Deposits

Wetland Hydrology Indicators

- B16 Moss Trim Lines

Wetland Hydrology Indicators

Regional Supplements

- Group C (examples may vary by region)
  - C1 (Hydrogen sulfide odor)
  - C2 (Dry-season water table)
  - C3 (Oxidized rhizospheres along living roots)
  - C4 (Presence of reduced iron)
  - C7 (Thin muck surface)
  - C8 (Crayfish burrows)
  - C9 (Saturation visible on aerial imagery)

Wetland Hydrology Indicators

C1 – Hydrogen sulfide odor

- Rotten egg odor
- Observed within 12 inches of the surface
- Also indicates hydric soil

Wetland Hydrology Indicators

C2 – Dry-season water table

- Water table is 12-24 inches from the surface
- Observed during the dry season or in a dry year

Secondary

Wetland Hydrology Indicators

C3 – Oxidized rhizospheres along living roots

- Within 12 inches of the surface
- Occupy 2% or more of the layer's volume

Wetland Hydrology Indicators

C4 – Presence of reduced iron

- Ferrous iron test or color change upon exposure to air
- Within 12 inches of the surface

Wetland Hydrology Indicators

C8 – Crayfish burrows

Secondary Indicator

Wetland Hydrology Indicators

C9 – Saturation visible on aerial imagery

- Signatures must correspond to field-verified hydric soils, depressions or drainage patterns, or other evidence of a seasonal high water table

Secondary Indicator

Wetland Hydrology Indicators

Regional Supplements

- Group D (examples may vary by region)
  - D2 (Geomorphic position)
  - D3 (Shallow aquitard)
  - D5 (FAC-neutral test)

Wetland Hydrology Indicators

D2 – Geomorphic position

- Examples:
  - Localized depression
  - Linear drainageway
  - Concave position on a floodplain
  - Toe of slope
  - Fringe of water body
  - Shallow restrictive layer

Secondary Indicator

Wetland Hydrology Indicators

D3 – Shallow aquitard

- Capable of perching water within 12 inches of the surface
- Examples:
  - Permafrost
  - Hardpan
  - Clay layer

Secondary Indicator

WETLAND HYDROLOGY INDICATORS

FAC-neutral test

(OBL + FACW) > (FACU + UPL)

- List dominant species across all strata
- Drop any species that is FAC, FAC-, or FAC+
- More than 50% of the remaining dominants must be OBL and/or FACW

Secondary Indicator

Difficult Wetland Situations in the Atlantic Gulf Coastal Plain Region

- Some wetlands can be difficult to identify because wetland indicators may be missing at times due to natural processes or recent changes.

Problem Area wetlands

- Defined as naturally occurring wetland types that periodically lack indicators of hydrophytic vegetation, hydric soils, or wetland hydrology due to normal seasonal or annual variability.

Atypical Situations

- Defined as wetlands in which vegetation, soil, or hydrology indicators are absent due to recent human activities or natural events.

This Chapter is organized in the following sections

- Lands used for Agriculture and Silviculture
- Problematic Hydrophytic Vegetation
- Problematic Hydric Soils
- Wetlands that Periodically Lack Indicators of Wetland Hydrology
- Wetland/Non-Wetland Mosaics

Lands Used for Agriculture and Silviculture

- Often lack a natural plant community and may be planted in crops, pasture species, or desirable tree species that may be altered by mowing, grazing, herbicide usage, or other management practices.
- Soils may be disturbed by cultivation, land clearing, grading, or bedding

Lands Used for Agriculture and Siliviculture

- Some areas that are used for agriculture or silviculture still retain their natural wetland hydrology.
- In other areas, historic wetlands have been effectively drained and no longer meet wetland hydrology standards.
- Relic wetland indicators may still be present in drained areas.

Lands Used for Agriculture and Siliviculture

- Drainage systems use ditches, subsurface drainage lines or “tiles” to manipulate the water table and improve conditions for crops or other desired species.
- The effectiveness of drainage in an area depends in part by soil characteristics, the timing and amount of rainfall, and the depth and spacing of ditches or drains.

Lands Used for Agriculture and Silviculture

- Vegetation – The goal is to determine the plant community that would occupy the site under normal circumstances.
- Soils – Tilling of agricultural lands mixes the surface layer(s) of the soil and may cause compaction below the tilled zone due to the weight and repeated passage of farm machinery. A standard soil profile and examination for hydric soil indicators are often sufficient to determine whether hydric soils are present.

Lands Used for Agriculture and Silivículture

- Hydrology – The goal is to determine whether wetland hydrology is present on a managed site under normal circumstances.

Problematic Hydrophytic Vegetation

- As a result of climatic variability, agricultural use, or other human landuse practices some wetlands may exhibit indicators of hydric soil and wetland hydrology but lack any hydrophytic vegetation indicators.

Problematic Hydrophytic Vegetation

- Problematic hydrophytic vegetation can be identified and delineated using a combination of observations made in the field and/or supplemental information from scientific literature and other sources.

Problematic Hydrophytic Vegetation

- These procedures are only used when there are indicators of hydric soils and wetland hydrology present.

Problematic Hydrophytic Vegetation

- Temporal shifts in vegetation such as seasonal shifts in plant communities or drought conditions (lasting more than one growing season).
- Areas affected by grazing.
- Managed plant communities.

General Approaches to Problematic Hydrophytic Vegetation

- Direct hydrologic observation
- Reference sites
- Technical literature

Problematic Hydric Soils

- Soils with faint or no indicators
- Some soils that meet the hydric soil definition may not exhibit any indicators.

Problematic Hydric Soils

- Recently developed wetlands
- Seasonally ponded soils
- Red parent material
- Black parent material
- Glauconitic soils
- Thin mucky-peat surface over high croma sands
- Shallow spodic horizons

Problematic Hydric Soils

- Soils with relic or induced hydric soil indicators
- Some soils in the coastal plain region exhibit redoximorphic features and hydric soil indicators that formed in the recent or distant past when conditions may have been wetter than they are today.

Problematic Hydric Soils

- Relic historic hydric soil features may be difficult to distinguish from contemporary features.
- If indicators of hydrophytic vegetation and wetland hydrology are present, then hydric soil indicators can be assumed to be contemporary.

Wetlands That Periodically Lack indicators of wetland Hydrology

- Some wetlands in the Atlantic and Gulf Coastal Plain Region may not become inundated or saturated in some years.
- Seasonally ponded wetlands
- Seasonally saturated wetlands

Wetland/Non Wetland Mosaics

- A landscape where wetland and non-wetland components are too closely associated to be easily mapped or delineated separately.
- Ridge and swale topography in large flood plains, coastal flatwoods and savannas containing numerous shallow depressions, and coastal dune/swale systems.